REMARKS

Amendments

Independent claims 1 and 17 have been amended to define the claimed process as a continuous process for simultaneously preparing multiple grades of base oil products and middle distillates from a mineral crude derived feed, support for which amendments is found in paragraphs [0001] and [0014] of Applicants' published application.

Claims 1 and 17 are also amended to emphasize that the entire full range residue obtained in step (b) is catalytically dewaxed in step (c), in contrast to prior art processes wherein the full range residue is subjected to an intermediate vacuum distillation step prior to catalytic dewaxing. Support for this amendment is found in paragraphs [0017] and [0068] of Applicants' published application.

Claim 1 has been further amended to recite a preferred embodiment of the present invention in which at least part of the catalytically dewaxed oil obtained in step (c) is hydrofinished prior to distillation to isolate the multiple grades of base oil products. Hydrofinishing is recited in amended step (d) while distillation to simultaneously produce multiple grades of base oil products is now recited in step (e). Support for these amendments is found in paragraphs [0053] and [0018] of Applicants' published application. It is disclosed in Paragraph [0018] that two or more base oil grades are isolated from the dewaxed oil by distillation. It is disclosed in paragraph [0053] that prior to performing the distillation step, all or part of the effluent from the dewaxing step is preferably subjected to a hydrofinishing step.

Claim 17 has been further amended to recite the embodiment of the present process wherein the gas oil fraction and fraction boiling below the gas oil fraction are removed from the dewaxed oil prior to subjecting the dewaxed oil to hydrofinishing. Support for this amendment is found in lines 11-20 of paragraph [0053] of Applicants' published application. The newly added step of distilling the hydrofinished, dewaxed oil to simultaneously provide multiple grades of base oil products is supported by the disclosure in paragraph [0018] of Applicants' published application.

The newly added step to claims 1 and 17 of isolating a dewaxed gas oil from the dewaxed oil as obtained in step (c), wherein the dewaxed gas oil obtained in step (c) comprises between 10 and 40 wt% of a dewaxed heavy gas oil boiling for more than 70 wt% between 370 and 400°C, is supported by the disclosure in paragraphs [0019] and [0020] of Applicants' published application.

Claim 8 has been amended to recite specific base oil grades that are simultaneously provided by distillation step (e). Support for this amendment is found in paragraph [0062] of Applicants' published application.

Claim 24 has been amended to correct the inadvertent omission of the word "the" before "full range residue".

Claim Rejections – 35 USC § 103

The Rejection of Claims 1-4, 7, 8 and 12-23 Under 35 USC §103(a) as Being Unpatentable over Van Beijnum et al (WO 02/50213: US equivalent – US Patent 7,347,928) ("Beijnum") in View of Van Ballegoy et al (US Patent 6,576,120) ("Ballegoy") is Respectfully Traversed.

The Present Invention

The present invention provides a continuous process to simultaneously prepare multiple base oil grades and middle distillates from a mineral crude derived feed. Applicants have found that middle distillates and multiple base oil grades having more evenly distributed pour points can be prepared in a continuous manner by subjecting a mineral derived crude feed to a specific sequence of steps, including: (a) hydrocracking the mineral derived crude feed with a particular defined hydrocracking catalyst; (b) distilling the hydrocracked product to provide middle distillates and a full range residue from which compounds boiling above 420 °C are not separated; (c) catalytically dewaxing the entire full range residue, without any intermediate distillation, using a particular dewaxing catalyst comprising an MTW type zeolite; (d) hydrofinishing all or part of the catalytically dewaxed oil; and, (e) distilling the dewaxed, hydrofinished oil to simultaneously provide multiple base oil grades; and (f) isolating a dewaxed gas oil from the dewaxed oil as obtained in step (c), wherein the dewaxed heavy gas oil obtained in step (c) comprises between 10 and 40 wt% of a dewaxed heavy gas oil boiling for more than 70 wt% between 370 and 400°C. See paragraphs [0013] through [0020] and paragraph [0053] of Applicant's published application.

The specific novel features of the presently claimed process being relied on to distinguish the process over the prior art include the fact the process is a continuous process (as opposed to a process operated in a blocked-out mode, as hereafter discussed); that the process can be used to simultaneously prepare multiple base oil grades as well as middle distillates; that the process involves catalytically cracking the entire full range residue, without any intermediate distillation

step; that the catalytic dewaxing step be performed with an MTW-type zeolite; that at least part of the hydrofinished, catalytically dewaxed oil be distilled to simultaneously produce multiple base oil grades; and that a dewaxed gas oil be isolated from the dewaxed oil as obtained in step (c), wherein the dewaxed heavy gas oil obtained in step (c) comprises between 10 and 40 wt% of a dewaxed heavy gas oil boiling for more than 70 wt% between 370 and 400°C.

Beijnum

The Beijnum reference discloses a process to prepare a spindle oil, a light machine oil and a medium machine oil base grade in improved yields by performing four distinct steps. Step (a) involves performing a separate catalytic dewaxing on a spindle oil fraction, a light machine oil fraction and a medium machine oil fraction as obtained from vacuum distillation of the bottom fraction of a fuels hydrocracking process (col.1, lines 48-51). This step in Beijnum is totally unlike step (c) of the present process, which involves catalytically dewaxing the entire full range residue. The various base oil fractions are not separately dewaxed in Applicants' process, as is the case with Beijnum.

Step (b) of Beijnum involves performing a separate hydrofinishing of the light and medium machine oil fractions obtained in step (a) (col. 1, lines 52-53). This step is unlike step (d) of the present process in that in Applicants' process the catalytically dewaxed oil from step (c) is hydrofinished before being separated into multiple base oil grades. Such separation into multiple base oil grades does not occur in Applicants' process until distillation step (e), which follows hydrofinishing step (d).

Step (c) of Beijnum involves separating the low boiling compounds from the spindle oil, light machine oil and medium machine oil fractions obtained in steps (a) and (b) to obtain a spindle oil, light machine oil and medium machine oil base grade (col. 1, lines 54-57). In the process recited in present claim 1, the multiple base oil grades are simultaneously produced in distillation step (e).

Step (d) of Beijnum involves to alternative modes of performing the vacuum distillation used to separate the gas oil, spindle oil and machine oil fractions prior to catalytic dewaxing. In one mode the bottoms fraction is separated into one or more gas oil fractions, a spindle oil fraction, a medium machine oil fraction and a first rest fraction. In the second mode the bottoms fraction is separated into one or more gas oil fractions, a spindle oil fraction, a light machine oil fraction and a second rest fraction boiling above the light machine oil fraction (col. 1, lines 58-67).

In marked contrast, in Applicants' process there is no separation of a spindle oil fraction, a light oil fraction or a medium machine oil fraction prior to catalytic dewaxing. Instead, in Applicants' process the entire full range residue boiling substantially above 340 °C is catalytically dewaxed without separating compounds boiling above 420°C from the full range residue. This extremely important distinction between Applicants' process and the process disclosed in Beijnum will be discussed in greater detail in the following section responding to various issues raised in the subject Office action.

Response to Issues Raised in Subject Office Action

Turning now to specific comments made in the subject Office action regarding Beijnum, Applicant agrees that Beijnum discloses a process for making multiple grades of base oils products. However, the process disclosed Beijnum is different from Applicants' process in several significant and non-obvious respects as hereinafter discussed.

While Beijnum discloses hydrocracking a mineral derived feed and distilling the effluent from the hydrocracking step into at least one middle distillate product and a full range residue as stated in paragraph 5 (a) and (b) of the subject Office action, Beijnum does not disclose catalytically dewaxing of the full range residue as stated in paragraph 5 (c) of the subject Office action. Referring to Figures 1 and 2, col. 7, lines 14-52, of Beijnum, which the Examiner cites as teaching catalytic dewaxing of the full range residue, it can be seen that the full range residue (which is referred as the bottoms or hydrowax fraction (8) in Beijnum) is further separated in vacuum distillation unit (9) into a heavy gas oil fraction(10), a vacuum gas oil fraction (11), a spindle oil fraction (12), a medium machine oil fraction (14) and a first rest fraction (13).

It is the individual spindle oil and machine oil fractions that are further processed in a blocked out mode in catalytic dewaxing unit (15). (See col. 7, lines 30-35 wherein it is stated: "In a blocked out mode the spindle oil fraction (12) (not shown) and the medium machine oil fraction (14) (as shown) are further processed, from storage tanks (12') and (14'), in catalytic dewaxing unit (15) yielding a dewaxed fraction (16)".

Thus, Beijnum does not teach dewaxing the full range residue from step (b), but instead teaches vacuum distilling the full range residue into further fractions. It is these individual fractions, and not the full range residue, which are catalytically dewaxed in Beijnum in a blocked out mode.

The significant advantage of Applicants' process over the process disclosed in Beijnum is illustrated by the difference in equipment required in the respective processes. For example, since Applicant does not vacuum distill the full range residue and operates the process continuously, Applicants' process does not require a vacuum distillation unit 9, nor storage tank 12' for the spindle oil fraction, nor storage tank 14' for the medium machine oil fraction as shown in Fig. 1 of Beijnum. Likewise, the Applicants' process does not require vacuum distillation unit 9, nor storage tank 12', nor storage tank 22' as shown in Fig. 2 of Beijnum.

Thus, the process recited in amended claims 1 and 17 (and the remaining claims through dependency) is clearly distinguishable from Beijnum on the basis Beijnum does not teach or suggest catalytically dewaxing the entire full range residue obtained form step (b). Instead, Beijnum teaches that the full range residue (i.e., the bottoms or hydrowax fraction) should be subjected to vacuum distillation to separate the full range residue into various lube oil fractions, which are individually dewaxed in a blocked out mode.

Applicant acknowledges that ZSM-12 disclosed in Beijnum is an MTW-type zeolite. However, it is noted that ZSM-12 is only one of many zeolites disclosed in Beijnum for use in the heterogeneous dewaxing catalysts, most of which, including ZSM-5 used in Example 3 of Beijnum (col. 9, lines 25-48) are not MTW-type catalysts. Applicant has made a showing that catalysts based on a MTW-type zeolite provides unexpectedly superior pour point profiles than a catalyst based on ZSM-5 zeolite employed by Beijnum (See Figure 1 and paragraph [0073] of Applicants' published application which show that base oil grades prepared in Examples 1-3 using a MTW-type zeolite have a preferred flat pour point profile compared to the base oil grade prepared in Comparative Example A using a ZSM-5 zeolite, which had a sloped pour point profile indicating a pour point giveaway.

In addition to the aforementioned distinctions, Beijnum also fails to teach step (f) recited in the amended claims, which involves isolating a dewaxed gas oil from the dewaxed oil obtained in step (c), wherein the dewaxed oil comprises between 10 and 40 wt% of a dewaxed heavy gas oil boiling for more than 70 wt% between 370 and 400°C.

Ballegoy

Ballegoy discloses a process for catalytic dewaxing of a hydrocarbon feed to produce high yield of base oil product by using a catalyst composition comprising a metallosilicate crystallite and a binder in a weight ratio of 5:95 to 35:65. Ballegoy is apparently cited for its teaching that

ZSM-12 has a MTW-type topology, which Applicant acknowledges. However, ZSM-12 is only one of many zeolites disclosed in Ballegoy, which also discloses MFI-type zeolites, TON-type zeolites and MTT-type zeolites (col. 4, lines 9-29). There is no teaching or suggestion that a MTW-type zeolite would be superior to any other type of zeolite in catalytically dewaxing a full range residue as part of a continuous process for simultaneously preparing multiple base oil grades and middle distillates from a mineral crude derived feed.

More importantly, Ballegoy does not overcome the deficiency of Beijnum in failing to teach step (c) of the presently claimed process which involves catalytically dewaxing the entire full range residue obtained from step (b). Ballegoy also fails to teach step (f) of the present process which involves isolating a dewaxed gas oil from the dewaxed oil obtained in step (c), wherein the dewaxed oil comprises between 10 and 40 wt% of a dewaxed heavy gas oil boiling for more than 70 wt% between 370 and 400°C.

The Rejection of Claims 5 and 24 Under 35 USC §103(a) as Being Unpatentable over Van Beijnum et al (WO 02/50213: US equivalent – US Patent 7,347,928) ("Beijnum") in View of Van Ballegoy et al (US Patent 6,576,120) ("Ballegoy") and Further in View of Moore et al (US Patent 6,583,186) ("Moore)" is Respectfully Traversed.

In paragraph 18 of the subject Office action the Examiner acknowledges that Beijnum does not disclose adding a Fischer-Tropsch derived isomerized paraffin fraction to the full range residue prior to dewaxing. In fact, as previously discussed, Beijnum does not even catalytically dewax a full range residue, but instead subjects the full range residue to vacuum distillation to produce base oil fractions, which are subsequently individually catalytically dewaxed in a blocked out mode.

Moore does disclose that light and heavy fractions obtained by Fischer-Tropsch synthesis can be combined with similar fractions obtained from the fractional distillation of crude oil. However, it is pointed out that Moore is primarily concerned with producing liquid fuels, rather multiple grades of base oil products, which are of primary concern to Applicant and to Beijnum (see lines 2-5 of the abstract in Moore and col. 1, lines 45-49). In addition, it is noted that Moore teaches the hydroisomerization conditions and hydroisomerization catalysts which can be employed in the disclosed process for producing liquid fuels. Moore does not disclose catalytic dewaxing conditions and catalytic dewaxing catalysts similar to Beijnum, as alleged in the subject action.

However, even assuming arguendo that all of the statements made in paragraph 18 of the subject action are correct, claims 5 and 24 would still be patentable because these claims, through dependency, contain all of the limitations of independent claim 1 and 17, respectively. Therefore, claims 5 and 24 are patentable over the cited references for the same reasons as discussed above in connection with claims 1 and 17, i.e., none of the cited references alone or in combination teach or reasonably suggest catalytically dewaxing the entire full range residue obtained in step (b) and none of the cited references alone or in combination teach or reasonably suggest step (f) of the present process, which involves isolating a dewaxed gas oil from the dewaxed oil obtained in step (c), wherein the dewaxed oil comprises between 10 and 40 wt% of a dewaxed heavy gas oil boiling for more than 70 wt% between 370 and 400°C.

CONCLUSION

For all of the above reasons, and in view of the amendments, it is believed that claims 1-5, 7, 8 and 12-24, in their present form, are patentable over the prior art. Accordingly, reconsideration and allowance of these claims is respectfully requested.

Respectfully submitted,

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